PATENT SPECIFICATION

986,093

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Int. Cl.:—A 47 c // G08c.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Seats and Devices for use in their Development

We, Ford Motor Company Limited, of 88 Regent Street, London, W.1., a Company incorporated under the laws of Great Britain, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to manikins for evaluating vehicle, particularly road vehicle, seats; and to a method of developing the resilient characteristics of different parts of a vehicle seat.

As used in this Specification the word "manikin" means a three dimentional representation of a human being. Generally the manikin is constructed so as to represent the average physical characteristics of a population whose individual physical characteristics fall within specified ranges as to various physical dimensions such as height and weight. When this is done the manikin is said to represent the average physical characteristics of a specified percentile of a given population.

According to one aspect of the invention a manikin which is for evaluating vehicle, particularly road vehicle, seats has a plurality of load-responsive devices which are fitted to the manikin at a plurality of places so as when the manikin is placed on a seat, to give an indication of the magnitude and distribution of pressures exerted on the manikin by the seat. The manikin constitutes a standard by which seats may be compared.

Preferably, the parts of the manikin which, in use, are in contact with the seat have a covering material which approximates in its mechanical behaviour to human flesh.

Where the manikin has such a covering the load responsive devices may be located within the covering material; or they may be located on the surface of a rigid core with which the covering material is in contact. Preferably, however, the pressure sensitive devices are situated close to the outer surface of the covering material.

The parts of the manikin which, in use, are in contact with the seat may, however, be of a hard rigid material; and, in this case, the load-response devices are fitted on the external surface of the hard rigid material.

According to another aspect of the invention a method of developing the resilient characteristics of a vehicle seat comprises: empirically adjusting the resilient characteristics of a seat so as subjectively to provide a satisfactory developed seat; placing a manikin according to the one aspect of the invention on the satisfactory seat and obtaining readings of the devices; placing the manikin on the seat under development and observing the readings of the devices; comparing the readings obtained with the developed seat and the seat under development; and adjusting the characteristics of the seat under development in accordance with the readings until the readings of the seat under development and the developed seat are substantially the same. Having once established that a seat has, in the general opinion of passengers, a satisfactory degree of comfort, the manikin may then be employed in the development of further satisfactory seats of generally different construction and/or dimensions without the necessity of extensive and prolonged subjective tests.

The invention is hereinafter particularly described with reference to the accompanying drawings in which:—

Fig. 1 shows the general form of a manikin suitable for use in the development of motor vehicle seats;

Fig. 2 shows a second view of the manikin;

Fig. 3 is a section through the manikin on the line III-III of Fig. 1;

Fig. 4 shows the type of strain gauge which is fitted on the manikin and

Fig. 5 is a schematic diagram which shows a multi-channel bridge circuit for measuring pressures on the individual strain gauges.

Fig. 6 shows an adjustable seat.

The torso 1 of the manikin has a hollow metal core 3; and the upper leg parts 5 of the manikin have a hollow metal core 7. The metal cores 3 and 7 are covered with a medium density foam rubber material 9 which has varying thickness so as to match the local hardness rates of human flesh and which has durable protective coating 11 such as Hypalon (Registered Trade Mark); and the metal cores 3 and 7 are jointed at a transverse pivot axis A.

The lower leg parts 13 are pivoted on the upper leg parts 5 about a transverse axis B; and feet 15 are pivoted on the lower leg parts about a transverse axis C.

The head is represented by a bent metal strip 17 which is pivoted on the torso 1 about transverse axis D.

The manikin is adjustably weighted by weights, such as weights 19, 21 and 23 which are supported on the metal cores 3 and 7 of the torso and upper leg parts 1 and 5, respectively.

A 7 x 7 matrix of load cells 25 (Fig. 4) is attached (Fig. 3) to the metal core 3 of the torso part 1. The load cells are individually accessible for service from the interior of the manikin. A matrix of similarly accessible load cells are attached to the metal core 7 of the upper leg parts 5.

Each load cell has a Duralumin (Registered Trade Mark) beam 27 to either side of which are secured strain gauges 29 and 31: the beam is supported between two steel outer plates 33 and 35 by rollers 37 which are soldered to the ends of the outer plate 33, and rollers 39 which are symmetrically located with respect to the ends of the strain gauges 29 and 31: and the assembly is completed by wire loops 41 which extend around the outer plate 35 and the beam 27 at the location of the inner rollers 39. Small notches in the edges of the beam 27 locate the wire loops without appreciably affecting the behaviour of the beam under load.

The load cells are fitted to the manikin with the plates 35 nearest the protective coating of the torso and upper leg covering.

Loading on the cells may be readily measured by the multi-channel bridge circuit (Fig. 5). After initial null settings of the ammeter 45 has been carried out in respect of each load cell by adjustment of the zero setting potentiometers 47 the load cells are successively switched into the bridge circuit and at each switching the resistance of the strain gauge 29 and 31 is measured by adjustment of the wiper 49 on the slide wire 43. The resistive reading obtained for each strain gauge is then converted into a pressure value by multiplication by a factor obtained during an initial calibration of the load cells. In order to obtain the calibration factor a suitable weight, say a one pound weight, is placed on each cell in turn and the adjustment which must be made to the slide wire to reestablish a null reading on the ammeter 45 is noted. It has been found that by a suitable choice of dimensions for the load cells differences in the conversion factors of the individual cells are not significant and a common calibration factor may be applied to the bridge readings for the cells.

In developing, say, a new driver's seat for a motor vehicle the manikin is placed on a seat which on the general concensus of opinion is regarded as a satisfactory seat when in use in the vehicle. The pressure distribution exerted by the seat on the manikin is measured, and the manikin is then transferred to a seat (Fig. 6) which is similar to the seat to be developed in so far as its spring construction and soft trim is concerned.

The seat (Fig. 6) differs from the seat to be developed, however, in that it is adjustable in the fore and aft direction and in height, pitch and squab rake. It also differs in having helical springs 51 of various rates, the latter rates being chosen in dependence upon the location of the helical springs in the seat. The helical springs are individually adjustable by tension adjusting devices 53.

The seat (Fig. 6) is adjusted so as to produce in the driver the same attitude as is obtained in the already proven seat: and the tension adjusting devices 53 are manipulated until the pressure distribution over the manikin is substantially the same as that obtained with the proven seat.

The seat (Fig. 6), in its finally adjusted position, is a prototype for the production seat to be installed in the vehicle.

WHAT WE CLAIM IS:—

1. A manikin which is for evaluating vehicle particularly passenger vehicle seats: and in which a plurality of load responsive devices are fitted to the manikin at a plurality of places to give an indication of the magnitude and distribution of pressures exerted on the manikin by the seat.

2. A manikin according to claim 1 in which the surface layer of the manikin is formed, at least in parts, of a material which approximates in its mechanical behavour to human flesh.

3. A manikin according to claim 1 or 2 in which the devices are located within

the layer.

4. A manikin according to claim 1 in which the surface of the manikin is formed of a rigid hard material.

5. A manikin according to claim 1, 2 or 4 in which the devices are located on the surface of the manikin.

6. A manikin according to any one of the preceding claims in which the load responsive devices are resistive strain gauges.

7. A method of developing the resilient characteristics of different parts of a vehicle seat: the method comprises empirically adjusting the resilient characteristics of a seat so as subjectively to provide a satisfactory developed seat; placing a manikin according to Claim 1 of the invention on the satisfactory seat and obtaining readings of the devices; placing the manikin on the seat under development and observing the reading of the devices; comparing the readings obtained with the developed seat and the seat under development; and then adjusting the characteristics of the seat under development in accordance with the readings until the readings of the seat under development and the developed seat are substantially the same.

8. A manikin substantially as hereinbefore described with reference to Figs. 1, 2 and 3 of the accompanying drawings.

M. C. DOBBS,
Chartered Patent Agent.

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986.093 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

Fig.1.

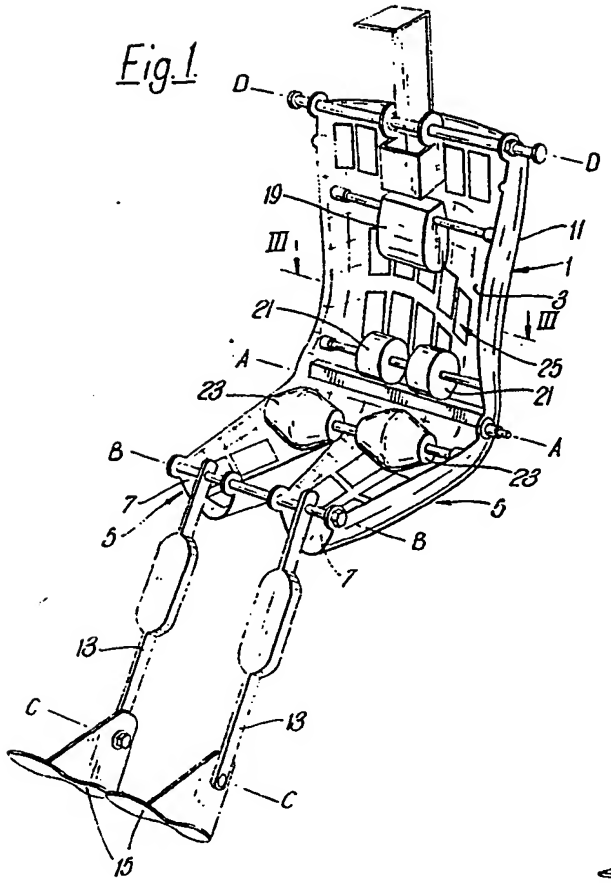


Fig.2.

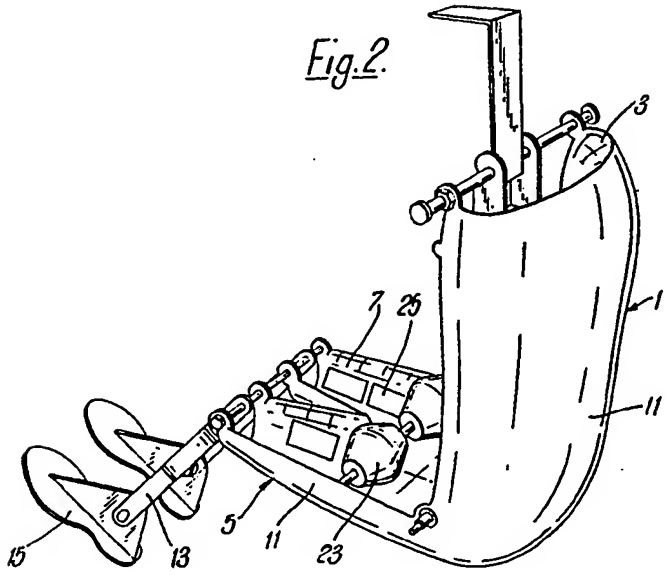


Fig.3.

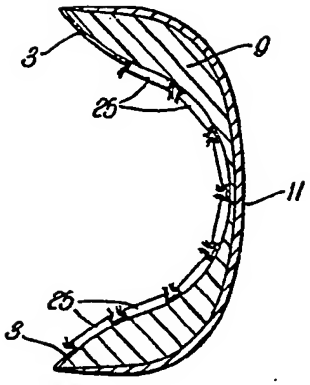
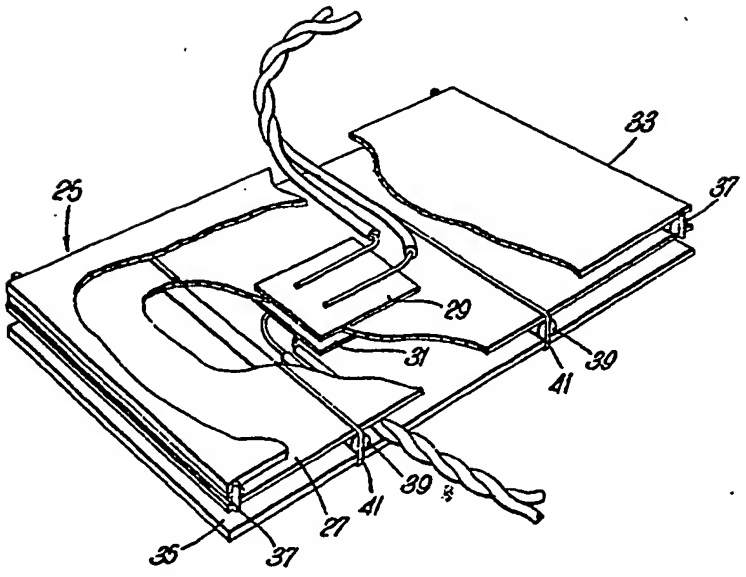


Fig.4.



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SHEETS 2 & 3

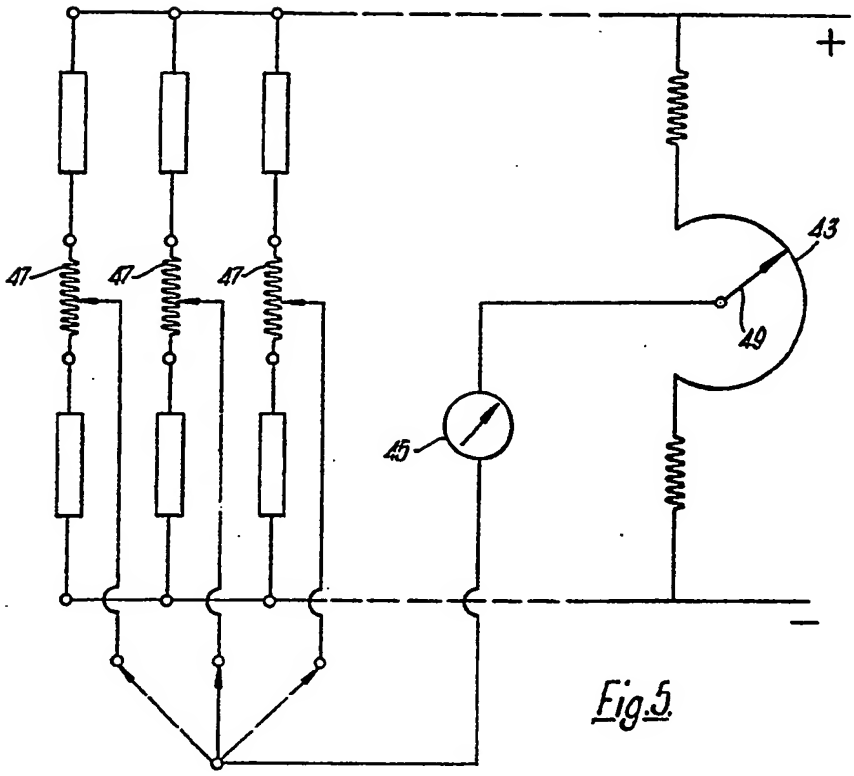

Fig.5.

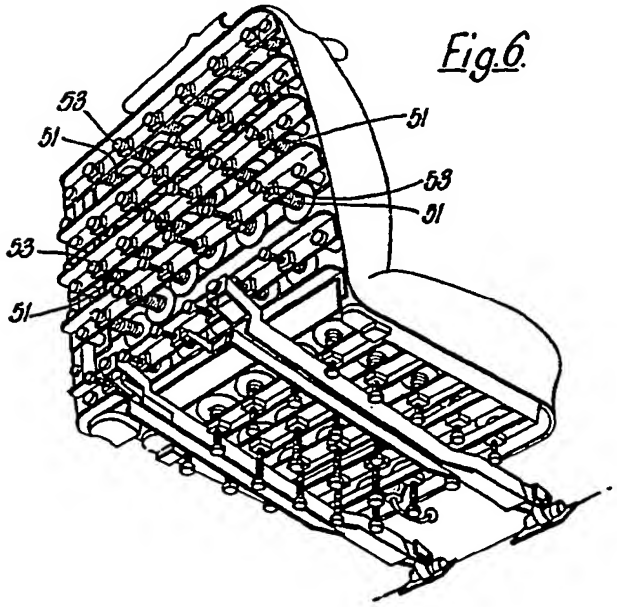

Fig.6.

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SHEETS 2 & 3

Fig.3.

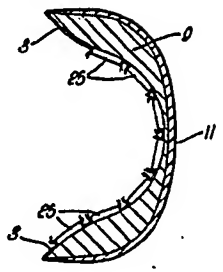
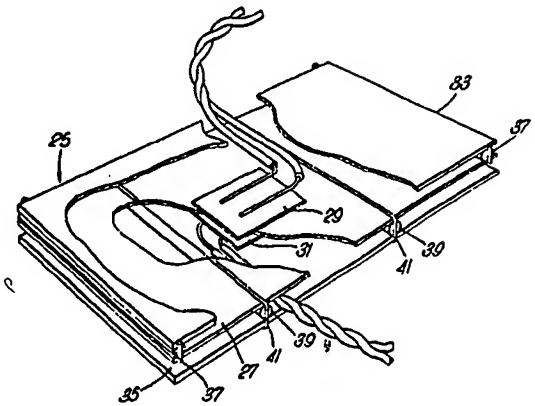


Fig.4.



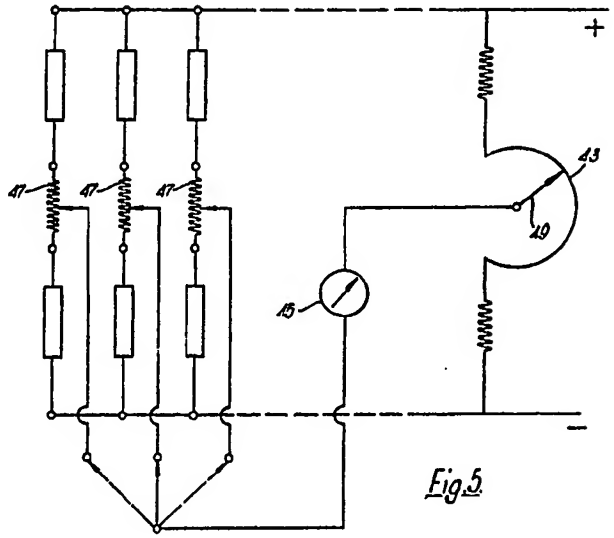
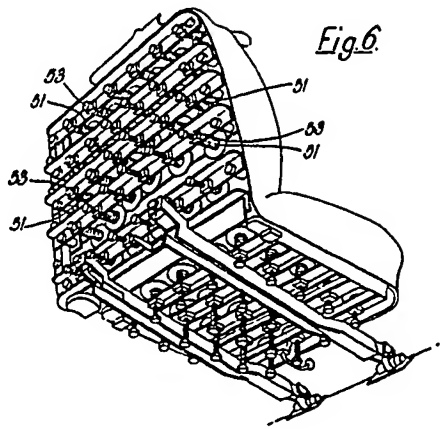


Fig.5.

Fig.6.



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PROCEEDING FURTHER WITH THE EUROPEAN PATENT APPLICATION PURSUANT TO ARTICLE 96(1) AND RULE 51(1) EPC

A supplementary European search report has been drawn up concerning the above European patent application (publication no. 1019693).

Since you have filed a request for examination prior to the transmission of the supplementary European search report, you are hereby invited to indicate within

TWO MONTHS

of notification of this invitation whether you desire to proceed further with the European patent application.

If you do not indicate in due time that you desire to proceed further with the Europeen patent application, it will be deemed to be withdrawn (Art. 96(3) EPC).

If you wish you may comment on the supplementary European search report and amend, where appropriate, the description, claims and drawings (Rule 51(1) EPC).

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